Third United Nations International Conference on the Peaceful Uses of Atomic Energy

A/CONF.28/A/426
JAPAN
February 1964
Submitted in:
ENGLISH and FRENCH

Confidential until official release during Conference

Abstract

DEVELOPMENT OF TOKAI REACTOR FUEL ELEMENTS

R. Sagane[1/], P.T. Fletcher[2/] and N.L. Franklin[3/]

The Tokai Power Reactor is the only magnox reactor designed in U.K. adopting hollow uranium tube fuel. The fuel elements of the reactor have been developed with keen collaboration between the fuel manufacturer (U.K.A.E.A.), the reactor designer (U.P.C.) and the purchaser (J.A.P.C.).

The paper describes the various aspects of the development works in following sections:

1. Special feature of Tokai fuel element:

   This section may include following three sub-sections:

   a. Description of general features:
      A brief description of the design and its philosophy referring to one or two diagrams. Special reference will be made to the general adequacy of design features to which reference is not made elsewhere, e.g. end cap push-off, creep of Zr. beam, etc.

   b. Advantages of hollow rods:
      Economics and engineering advantages of the reactor using hollow fuel, and economic analysis of merits of higher specific power.

   c. Function of graphite sleeves:
      Advantages of using graphite sleeved channel in a reactor. Special reference will be made to the moderator temperature control, prevention of channel contamination, etc.

1/ Japan Atomic Power Co.

2/ United Power Company Limited.

3/ United Kingdom Atomic Energy Authority.

2. Design and development programme for Tokai fuel:

This section may be divided into following two sub-sections:

a. Design development:
The design philosophy associated with the use of a hollow rod for high rating, the double grabbing system and shear pins, independent support, etc.

b. Development experiment:
Major development works performed by U.K.A.E.A. and U.P.C. Items included will be the effect of fin deformation, the tube creep collapse under the reactor condition, etc. The extent of the irradiation programme and the confidence placed in the overall performance of the design will be emphasized. The works will include the end plug variants, background hollow rod, prototype and replica experiments. The prototype experiment will be described as primarily to determine the behaviour of the bar.

3. Development of special manufacturing techniques:

Brief reference to manufacture applicable to hollow rod fuel.